

A Quantitative Measurement of Codebook and its Specialized Clustering Framework for Image Representation Strategies

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論文内容の要旨

Image Recognition is a kind of artificial intelligence and has a purpose to develop a computer that is able to understand and explain images in the real world. In general, the images in the real world have no constraint to viewpoints and shooting environments, there are some difficulties to adapt for deformation and occlusion of objects. Understanding images without any constraint have many important aspects in science, engineering, and technology. The aims of image recognition roughly divided into the following four tasks: object label recognition, detection of specified objects, semantic segmentation, and image retrieval. This dissertation focuses on object recognition, which is a central task over the recognition problems.

This dissertation consists of our three research articles. First, a clustering framework using the fuzzy theory is described. Its efficient modification is also presented and is applied to object recognition tasks. Next, we analyzed the general characteristics of codebook-based image representation approaches. The analyzed results show the relationship between codebook parameters and its recognition performance. In addition, a quantitative measurement was proposed. Finally, a clustering framework based on the measurement is proposed. Our proposal constructs appropriate codebook on the synthetic clustering datasets and is also efficient for image recognition problems.